Landbird Monitoring Protocol for Klamath Network Parks

Standard Operating Procedure (SOP) #6: Mist Netting

Version 1.0

Revision History Log:

Previous Version	Revision Date	Author	Changes Made	Reason for Change	New Version

This SOP provides the methods for conducting mist netting.

Introduction

This SOP gives step-by-step instructions for mist netting and banding birds, including completion of the data form, which is provided at the end of the SOP. The location of the mist net site is described in SOP #4: Locating and Marking Field Sites. Mist net procedures are based on standard protocols allowing contribution of data to various networks (DeSante et al. 2001, IBP 2007, KDMN 2007, LaMNA 2007, Ralph et al. 1993).

Equipment and Maintenance

Equipment

Each banding kit should have an equipment checklist that includes everything that is taken into the field, including net lane clearing and maintenance tools (SOP #1: Preparations and Equipment). Equipment and materials used in this program are expensive, difficult to replace, and should be handled with care. If any equipment is needed or requires replacement, the Project Lead should be notified as soon as possible.

Banding Kit Inventory

It is the responsibility of the Primary Bander (the bander in charge) of each crew to ensure the kit inventory is completed in a timely manner. The Banding Kit Inventory Form (see attached) is completed for each kit at the conclusion of every banding period (e.g., week, 10-day) by the crew who used it during that period. Each item on the list is necessary at one time or another, so it is important to ensure the kit is complete. Kit items that have less than the required amount (you should note this in parentheses next to each item on the form) must be replenished from the supply inventory. All equipment and materials that are removed from the supply inventory must be checked out. If any items needed are not available, the Project Lead should be notified as soon as possible so that the shortage can be resolved before it becomes a problem.

SOP #6: Mist Netting (continued).

Bird Bags

Banders should always have some bird bags with them while nets are open (or being opened). Avoid placing more than one bird into a bag at a time (see NABC manual for the rare exceptions; NABC 2001a, NABC 2001b). Using a bag more than once is fine, but as it becomes overly soiled, it should be turned inside out and segregated from the rest of the bags.

At the end of a banding period, bird bags should be laundered. Turn the bags inside out and shake debris away. Loosely fill a mesh (lingerie) washing bag with the soiled bird bags (so they don't unravel or become severely tangled together) and wash on the gentle cycle in hot water with a small amount of detergent and chlorine bleach. Leave bags inside the washing bag for drying. After drying, reverse the bags so that the raw edges of the seams are on the outside. Trim excess frayed or loose threads to reduce tangling on the birds. Be sure to remove damaged bags (without strings and/or with holes or unraveled seams) that cannot be wrapped shut, or from which a bird could escape, from the kit. Repair them if possible, or else dispose.

If a suspected diseased or bleeding bird is captured, it is important to put that bag aside until it has been washed and disinfected. Also take the time to wash and disinfect your hands with the antiseptic towelettes or lotion provided in the banding kit before handling other birds or any tools and equipment. Periodically take the time to clean your hands during the banding session.

Net Repairs

Mist nets are quite expensive, but with proper handling and regular maintenance, they should last a long time. It is very important that damaged nets be repaired as soon as possible or be removed from the kit until such time they can be repaired. Damaged nets pose a danger to birds that become entangled in them. Mesh holes and broken or undone trammel lines can cause extreme tangles that unnecessarily threaten bird safety and take much longer to untangle. Net repair kits are included in each banding kit and should be out and used as frequently as is necessary. A description of common net repair techniques (Appendix A; Ralph et al. 2004) is included in this document to supplement training. Realize that nets cost about $60 each, so a half-hour of repair more than pays for itself. A good rule of thumb to determine if a net should be repaired is estimating the time necessary to complete the repair. If the repair will take about five minutes (about the time that one would spend extracting a couple birds), then repair it right away; if a longer time is necessary, then wait until after the netting session so that capture rates are not affected by net location disturbance. If banders do not have time to repair the net immediately or sometime during the banding session, then while closing the nets, mark any damaged nets with flagging. Make notes on the flagging using a sharpie pen indicating the size and location of the damage. Then, as soon as possible, repair it! Primary Banders (the banders in charge) have the responsibility to make sure that net repair, instruction, and practice are a regular part of the banding effort schedule, whether during the banding session, afternoons, or on office/maintenance days.

Net Lanes

Net lanes should be cleared of vegetation to approximately one meter on either side of the net and at least one meter above the height of an open net. Net lanes must be maintained throughout the season. Cut back any new growth so that it does not become entangled in the net. Net lanes should be discreetly marked with flagging labeled with the station code and net number written in permanent ink.

SOP #6: Mist Netting (continued).

It is necessary to set up and remove the nets for each banding session. One end of the lane should be established as the fixed end and one end as the moveable end (Figure 1 A). This allows for adjustment to accommodate variations in net length and adjusting net position within the lane. You will need two 10'x ½" diameter conduit section poles, one 1'x ¾" diameter PVC pipe section, three 2'x $^{3}/_{8}$" (or ½") diameter steel rebar sections bent 90º at one end, three 8' sections of ¼" diameter unmanila (three-strand twisted polypropylene) rope, and two ¾" swivel snaps for each net. Install a PVC section at what will be the fixed end of the net lane (Figure 1 B). This should be placed at the end where there is the least public traffic. The PVC should be installed at a slight angle away from the direction the net is running. This will help maintain the pole in a vertical position against the tension of the opened net. At the fixed end, install one guy line directly in line with the net. Using the #3 mallet, drive the rebar into the ground approximately 1.5 m away from the PVC at an angle facing away from the net. Tie a section of rope to the rebar and make an adjustable slipknot at the net pole end of the rope. Measure the length of the lane using an old net, a net-length section of rope, or by pacing. Install two guy lines at approximately 120° angles to the pole, forming a triangle with the pole. The rebar stakes should be driven in at angles of 50° to 60° to the substrate, away from the net and poles at each end. If it is not possible to drive the rebar stake into the ground, as will happen at areas with a rocky substrate, the stakes must be buried, or an appropriately situated stone or tree used to anchor the guy line(s).

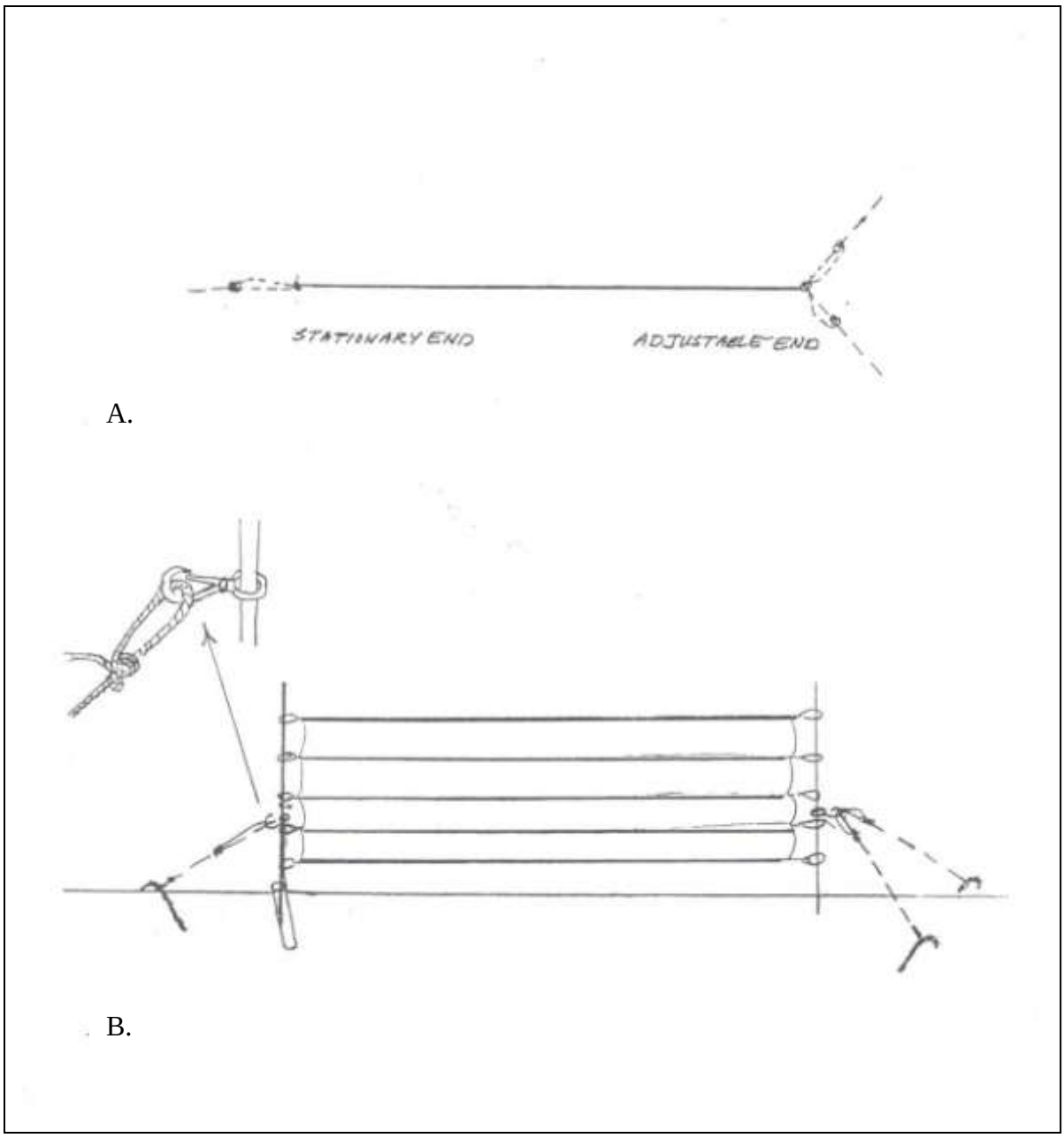

Figure 1. Net installation, shown as (A) birds eye view and (B) side view with detail of swivel snap.

Net Set-up

Using the method involving the plastic bag (Appendix B; Blackshaw 1993) and the pole-guy line-shackle arrangement described above, a net should be set up in about 2 minutes. As the net lane is approached, locate and lay out the poles and guy lines at each end of the net lane. Two ¾" shackles (a.k.a. swivel snaps) are slipped onto the poles and used to connect guy line ropes to the poles. Starting at the fixed end, insert the pole through the net loops and then put the shackle on the pole. Set the pole into the PVC and attach the guy line. Walk to the moveable end, feeding the net out of the bag as you go, being sure to keep enough tension on the net to keep it from dragging on the ground. When you reach the moveable end of the lane, place the net and then the

shackle on the pole. Usually two net loops are placed below the shackle. Attach the two guy lines to the shackle, pull the net taut, and slide the shackle up the pole to tighten the guy lines. Nets made of nylon stretch out after opening and will most likely need to be tightened on the next net check.

Since two people set up a net only slightly faster than one, it is much more efficient for banders to split up (rather than leap-frog) and work toward one another from opposite ends of the net array. However, factors such as a bander who is unfamiliar with net locations or a planned area search may make other arrangements desirable. What is important is that the nets are opened as rapidly as possible and that banders at the station are in communication with one another. The plastic (grocery) net storage bag should be left at the net, bunched up, and secured under a rock or under the rebar stake at the moveable end of the net and out of sight. It is important to stash the bag so that it is not loose to blow in a breeze and disturb nearby birds.

Trails at each station must be kept cleared of hazards such as sapling stumps, low branches, loose stones, and thorny vegetation. The trails should be safe to move quickly through without tripping and ducking. Banders should be aware that brushing against thorny vegetation such as blackberry or hawthorn could possibly injure a bird in a bag. Diligence in trimming new growth during the late spring and summer vegetation-growing season is necessary to maintain safe conditions at netting stations. If a treefall or other event causes a trail (or net lane) blockage, notify the Project Lead or support staff as soon as possible so that the problem can be resolved.

Running the Station

All banders running the stations should read and thoroughly understand the following station management procedures, The Handbook of Field Methods For Monitoring Landbirds (Ralph et al. 1993), The North American Banders' Study Guide (NABC 2001a), The North American Banders' Manual for Banding Passerines and Near Passerines (NABC 2001b), and the Introduction section (pp. 1-40) of the Identification Guide to North American Birds, Part I (Pyle 1997). The importance of the information contained in these documents cannot be stressed enough. Understanding this information will ensure consistency in station management and data collection and will protect the health, safety, and wellbeing of the birds.

Opening Nets

The objective is to operate each net for 5 hours. Banders should be at the station 20-30 minutes prior to local sunrise, begin opening the nets 15 minutes prior to local sunrise, and shut down operation so that each single net is operated for 5 hours. Be sure to have cached at each banding station (or otherwise have on hand) spare equipment (poles, rope, stakes, etc.) to get every net set up promptly every session. Banders must have bird bags and hand nipper-shears on their person at the opening and throughout the banding session for early captures and minor vegetation trimming. At least a couple net-numbered clothespins should be brought to each net at opening as well.

Rainy Day Procedures

1. If the scheduled banding session is interrupted by rain *or other events*, please use the following guidelines. This is especially important if one is at or near the end of a sampling period, or the station is very remote.

2. The major objective of a constant effort station is to usually run each net for a certain 5 hours each week or 10-day period, starting 15 minutes prior to local sunrise. If you have to close nets shy of the magic number of hours, we suggest the following, in order of priority.

3. Attempt to operate each net for the standard number of hours, within the first 7 hours following local sunrise.

4. We suggest that you operate each net for at least 1 hour within the 2 hours following local sunrise to include the maximum capture rate.

5. If possible, operate each net for a minimum of 60% of the standard number of hours (i.e., 3 hours) during the first 7 hours following local sunrise.

6. If a net or nets cannot be operated (e.g., flooding, treefall), then a temporary replacement(s) should be set up as near as possible until such time the detriment to the original net(s) is removed. Secondarily, other nets should be operated for the minimum 60% of the standard number of hours during the first 7 hours following local sunrise. Every effort should be made to restore the original net array as soon as possible.

7. If you cannot meet the above criteria, we suggest that you operate the nets on the next available day, during the hours missed.

8. At times, it is impossible to complete the netting at a station within the prescribed period.

9. In this case, we strongly suggest that you do a make-up, by operating very early in the next period, rather than not take a sample at all for that previous period. Then, to get in the netting session for the current period, wait at least 3 days before operating the nets again.

Checking Nets

1. Several factors should be kept in mind when checking nets. Nets should be checked every 20-40 minutes depending on environmental conditions, numbers of birds, and the experience level of the personnel. Environmental conditions to be considered include wind, rain, and temperature extremes (Ralph et al. 1993). If a bird is incidentally seen in a net, it should be removed immediately with the capture time recorded as the next scheduled net round. Personnel should always be in communication with each other at the station. Carry and use the two-way radios provided in the banding kit. Personnel should always carry the small pair of scissors provided in the banding kits to use in the event of an extremely tangled bird, a dropper bottle of sugar water to revive stressed hummingbirds, and hand nipper-shears for net lane maintenance pruning.

2. Most importantly, schedule the next net round and write it down as a reminder on the journal page immediately upon returning to the banding station.

Busy Day Procedure

The purpose of a busy day procedure is to provide guidelines that clearly outline steps for a Primary Bander to consider when high volumes of birds are captured at a station. When faced with large numbers of birds, the primary concern for banders is bird safety and this procedure should be implemented in order to avoid leaving a net unattended for more than 45 minutes and to avoid holding birds for more than 2 hours due to a backlog. When followed, these guidelines will allow banders to efficiently and safely deal with large numbers of birds, while assuring that the most valuable data are accurately collected. Examples of the considerations taken into account by this procedure include:

1. Data collected from capturing the more uncommon birds are more valuable than taking complete data on, or even banding common species, certainly more than 10 birds of a species; and

2. Data collected on a recaptured individual are much more valuable than data collected on newly banded individuals.

Options to consider when faced with large numbers of birds include making more frequent net rounds, adjusting the allocation of personnel, taking minimum data, and releasing birds unbanded. Specifically, we want banders to:

1. Remove birds from nets as quickly as possible, as they can remain quite healthy in shaded bags for one hour, perhaps longer under ideal conditions.

2. Take minimum data until the capture rate slows down if too many birds are encountered in nets for processing before the next round. Be sure to maintain quality of data, especially of species, age, and sex determination. If more than 10 birds of one species are captured in a day, the remainder can, but only if you have quite a few birds that day, be released without banding. Try to age and sex these birds, if possible, and always record them on the "Unbanded Birds" sheet.

3. Close two to four nets, including those with high and low capture rates, and in different habitats, if possible, if too many birds are captured even with taking minimum data. No matter which nets are closed, the normal net checking route(s) should be maintained in order to avoid confusion about which nets have been checked.

4. Try to do net rounds as quickly as possible. Every 15-20 minutes is not too often, in order to minimize each bird's net time and degree of entanglement.

5. Use personnel effectively. Two people working together can process much more than twice the number of birds that a single person can, so long as one person records for the other. If it is time for another net round and there are still birds to be processed, it is best for both people to go on the net round, rather than just one. The birds are safer and less stressed inside of the bags than hanging in the nets.

6. Close further nets if more than about 10 birds are still in bags after 1.5 hours.

7. Reopen the nets once the number of birds hanging in bags has reached about 10.

As a general rule, birds should not remain unprocessed in bags for more than 1 hour from the time they were brought to the processing station. Keep in mind that a bird could have been caught in a net immediately after the net was last checked, and the total time in a bag can be considerable.

Under certain conditions, there may not be time to fully process each bird. In these situations, the bander must at least record the band number, species, age, sex, and net number of the bird. In a given situation, the need to collect minimal data will vary with numbers and experience of the banders. Just remember, the health of the netted birds is paramount.

Processing Birds

Efficient Banding Station Set-up

One of the most critical elements in station management is setting up the banding station to run efficiently, so that you minimize any stress on the birds (and yourself!). There are many things banders can do to reduce confusion, thus increasing efficiency and bird safety, at a banding station.

1. There are benches at ORCA that are used for the banding station and provide seating and a table work surface.

2. In order to determine skull ossification accurately, additional light is essential, not optional. The banding kits are equipped with high intensity flashlights for skulling. Set up the light with the chemistry stand or hang it from a tree branch close enough to the table so that the bander can use it without moving from the processing place.

3. Set up the essential banding tools on the table and set up the references within easy reach. The birds should be hung in a sheltered place within easy reach of the bander. You should not have to get up from the table or walk to where they are hung to get under a light to skull. This is to ensure that the birds are processed as rapidly as possible.

4. Lay out the tools where you find them most accessible on a small towel or bird bag and, for easy access, put them back in the same place when you are finished using them. Be sure to set up the scale within reach so that you do not have to get up to weigh the birds. When removing birds from bags, have a spot away from the immediate processing area where you pile the empty bags. This will keep the bags out of the way of the processing, where they will be handy for the next net round.

Order of Processing

1. Certain birds should be recognized as sensitive to the capture process and processed before other birds as a priority in processing order. Banders should be very familiar with which species possibly captured at their stations can be sensitive to the capture process. At ORCA, this group of birds includes hummingbirds, kinglets, wrens, juncos, towhees, and any other bird that appears stressed. Other birds that should be considered potentially sensitive include juveniles (especially of small warblers and finches), adult females with

fully developed brood patches, and individuals that are continually struggling and/or screaming. The bags containing such birds must be marked with an orange, red, or other brightly colored clothespin. These bagged birds should be segregated at the banding table area and brought to the attention of whoever is processing birds at the time. After priority birds are completed, birds should be processed generally in order of their increasing size (e.g., Bushtits before sparrows, before tanagers, etc.).

2. Banders should always collect and record data in the order that they are on the banding data form in order to maximize processing efficiency.

Use of the Tabular Pyle

The Tabular Pyle (Sakai and Ralph 2003) binder should be out and accessible at all times during the banding session. Banders should refer to it for each species as those species are processed. The Tabular Pyle is the authoritative reference for correct species codes and recommended band sizes, in addition to being a concise, comprehensive ageing and sexing key guide. Trainers should always use it as an example for trainees and for working through every bird possible as a learning experience. The original Pyle (1997) is in the banding kit for those rare or unusual birds and for supplemental reading when time allows, but the tabular version is designed for fast reference during the banding session. Regular and frequent study of the Tabular Pyle accounts on the top 20-30 species captured will prepare banders for timely, accurate, and safe processing of captured birds.

Empidonax Flycatchers

Keying out *Empidonax* flycatchers can be challenging but fun. If at all possible, every *Empidonax* bird banded should be given a band from the string designated as the "Empid string" and recorded on the special *Empidonax* data form (see attached). This data form and the table of body and plumage characteristics in the Tabular Pyle facilitate accurate identification of this (at times) confusing genus. It is not necessary to fill in all data columns for each bird; rather, record just those characteristics which you need to arrive at a species' identification. We suggest this approach: if you have an educated guess about the species identification based on your experience, start out with those characteristics that separate that species from its conspecifics. You can stop measuring and recording when you feel confident about your decision. If you're inexperienced with the flycatchers, or you've captured a bird that refuses to fit neatly into our classification scheme, then more effort will be needed. Be prepared for waves of *Empidonax* flycatchers (and *Catharus* thrushes), and familiarize yourself in advance with the measurement techniques and special data requirements. **Do not** record a bird as "*Empidonax* species" or "*Catharus* species!" All of these birds can be identified to species with the required certainty. If you know in advance exactly which characters and/or measurements are required to separate similar species and you are overwhelmed by a wave of birds, take the minimum amount of data and later identify each bird to species based on the data you have taken. Do not put a band on a bird you will not be able to identify!

Importance of Age

Virtually all analyses of banding data first divide the birds into age classes, usually just Hatch Year (HY)/Second Year (SY) vs. After Hatch Year (AHY)/After Second Year (ASY). While plumage, molt of wing feathers, feather wear, and breeding condition can all contribute to your decision or actually determine the age, the degree of skull ossification is the most certain. All

banders should **wear** and **use** Optivisors continuously whenever processing birds. Banders should be familiar with the Target Species list (Appendix C) that classifies species that can be precision-aged (e.g., SY versus ASY, After Third Year (ATY), etc.). For other species, while it is possible to determine SY or ASY ages (and we encourage this with time and safety allowing), the minimum data should be young versus adult. Always use absolute criteria. Using questionable criteria will be less than useful and will introduce problematic variables into the dataset when age or sex categories are determined with varying degrees of confidence. If the criteria are insufficient to make correct determinations at least 95% of the time, do not waste the time trying to make a determination.

The code for "Juvenal Plumage" refers to the easily seen plumage that can be positively differentiated as juvenal versus adult. Use the code "U" if the plumage was examined, but it was unknown if plumage is juvenal or not. Use "9" if you didn't take data on plumage. Under no circumstances use a dash ("-"), as it could mean "not known" (same as U) or "9" (data not taken). Use continuation lines (diagonal from upper left to lower right) where appropriate.

Recognizing and Treating Capture-related Stress and Other Common Injuries

1. *Capture-related Stress.*--All banders must be familiar with the symptoms displayed by captured birds (see NABC 2001a). If a bird is stressed, take minimum data and release. Be certain to release such birds at ground-level and be ready to recapture the bird if it doesn't fly. If a bird is stressed to the point of inability to fly, first try gently jostling the bird or tossing the bird in the air a few inches or so back into your hand. This often gets the bird's wings moving, stimulating its heart, and releasing it from shock so it flies away. If this does not work, then activate a hand-warmer packet (follow directions on package), place it inside a bird bag to one side of the warming box (e.g., a plastic-insulated cooler pack), and place the bird inside, but not next to the warmer. Cover the open box and set it away from the banding table in a safe, quiet place. Check on the bird after 10 minutes or so. Another alternative is to place the bird in the bag and put the bag under your shirt. Eyedropper bottles and a supply of sugar are in each banding kit for hummingbirds. If a captured hummingbird is displaying symptoms of stress, banders should consider giving it sugar water. The solution to be used is 4:1 water:sugar. The solution should be offered to the bird by squeezing a drop out of the dropper and holding it at the bill tip, inserting the bill tip or tongue tip into the drop no more than a millimeter. The hummingbird's tongue is frayed and sponge-like, and if it can take the sugar water, it will at this point. If it takes the sugar water, it will very quickly be energized and be able to fly. If it does not, consider treating it in the warming box. Keep in mind that hummingbirds go into torpor and may do so as a reaction to shock, appearing dead, but delay treating as a potential specimen. Birds other than hummingbirds should never be given sugar water, as it can act as a diuretic.

2. *Wing Strain*.--Wing strain (described in NABC 2001a) can occur in the net before and during extraction and during processing. Banders can minimize this problem by following proper net check schedule procedure, using proper net extraction (especially the Body Grasp extraction method), and using proper Bander's Grip handling. Wing strain will usually be evident by one wing held noticeably lower than the other. If wing strain is suspected, the bird, prior to point of release, should be momentarily held in the Photographer's Hold and allowed to flap its wings. If the wings do not readily flap, move

the held bird up and down a few inches a few times (this will usually prompt a bird to flap its wings). If the bird has not yet flapped its wings, it should be placed into a bird bag and set in a safe, quiet place away from the banding table. Check on the bird after 20 minutes and attempt to release as above. Holding the bird for up to several hours may be necessary. The NABC manuals describe other, less common, injuries and treatments.

Priority of Data

The most important data are: species, band number, age (at least to the degree of hatching year vs. after hatching year), sex, capture time, and net location. If time permits, other data in the following order are important: breeding condition (if not noted in determining sex), wing molt, molt limits, primary wear, body molt, wing length, weight, and fat.

Recording How Aged and How Sexed

The codes for characters used in ageing and sexing birds are included in each banding kit (laminated reference sheet) and in Appendix D. As our knowledge of ageing and sexing birds develops, some characters may prove to be more or less useful than we now understand them to be. By recording at least two characters used in determining age and sex, we have found that age and/or sex ratios may be recalibrated by checking the data that have been recorded. Further, for data analyses, it may also be useful to note whether a spring bird was aged AHY based on inconclusive results after carefully examining the bird, or if it was not carefully examined and quickly processed due to a backlog of birds. The process of recording "how aged and how sexed" codes provides increased flexibility and greater resolution in describing age and sex determinations. It also provides lesser-experienced banders a simple and easily remembered basis for their data collection.

The most definitive characters should be used and recorded. Banders should especially pay attention to the detail of what plumage is observed in birds and use the most precise code possible. Banders should note that the use of several codes requires an accompanying note, e.g., "Q, Y, L, W, V, M, O, and Z."

Whenever molt limits are looked for, a code should be recorded in the "Molt Limit" fields (e.g., no molt limits found, record "0;" molt limit in greater coverts found, record "G"). Banders should record all molt limits found (e.g., if more than two limits are found, record in notes).

The use of the "0," "U," "Z," and "9" codes are very helpful in analyses examining whether characters are useful for ageing and/or sexing. The use of "Z" should include a note on what the suspected age/sex is and what the conflicting characters are.

Recording Wing and Tail Molt

Wing molt should be recorded as symmetrical or adventitious in the data fields on the front of the form. The presence of tail molt should be recorded only in the notes on the back of the form. The details of both wing and tail molt should be recorded using the standardized notion method. The letter "P" denotes primaries, "S" denotes secondaries, and "T" denotes tail. The letters "L" and "R" indicate left or right, respectively. The feathers are also numbered in the standard manner as in the introduction to Pyle (1997). The letter "G" indicates that the specified feather is growing and the letter "X" indicates that the feather is missing. If the feathers missing or growing are in sequence, e.g., numbers one through five are growing, the numbers are recorded

forwards ("15") to include all the feathers. If the feathers are not in sequence, e.g., numbers one and five are growing or missing but not the feathers in between, then the numbers are recorded in reverse order ("51"). For example, you capture a bird that has primaries one through five, secondaries three and six, and the left tail feathers one through three are missing. This would be recorded in the notes in the following manner: "P15S63G, TL13X." All molting or missing flight feathers should be recorded, including those that may have been dropped by the bird during capture or handling. Be sure to include a note indicating if you were aware that feathers were lost during capture or processing.

Recording Notes

Notes should be made about specific plumage characteristics and measurements taken in addition to the normal data recorded on the front of the form, for example the length of the crown patch of an Orange-crowned Warbler or other criteria used to make age and sex determinations (see Table 1). Make notes as concise as possible and use the standard abbreviations found in Pyle (1997) p 732. When referring to a figure in Pyle, record the note as "Pyle Fig ### = X." If a feather sample was collected or a photo taken, record this in the notes. Note any injuries, malformations, or deformities, especially if a status code other than N (Normal) is used. All unbanded birds should have a note explaining why the bird was released unbanded.

Bands and Band Sizes

1. Birds should always be banded with the best-fitting size band. Refer to the band size reference for top 50 species captured (Appendix E). Band sizes for species not listed in this reference are listed in Pyle (1997) and the Tabular Pyle. The sizes listed are those recommended by the USGS Bird Banding Laboratory. If in doubt, and after measuring the tarsus, a bander determines that a size other than those recommended should be used, then a note that includes tarsus minimum and maximum width (to the nearest 0.1 mm) should be recorded.

2. Bands that are determined to be unreadable and replaced (Band Code C=Changed) must be taped to a sheet of paper with the readable digits, species, station, date, and replacement band number written and this information given to the field crew leader as soon as possible. It is very likely that the Bird Banding Laboratory will be able to discern the original number through an etching process.

3. Bands that are determined to be unsafe to the bird should be adjusted or replaced accordingly. When a band is changed, the OLD band is recorded on the recapture page with band code = "R." The NEW band is recorded on the new band sheet with the band code = "C." Notes referencing the matching band numbers should be recorded on both sheets. The new sheet should reference the OLD band number and the recap sheet should reference the NEW band number.

4. Bands should not be placed regularly on either the right or left legs, but on whichever is handy and available. Banders must be in the habit of inspecting both legs for an existing band.

Table 1. List of measurements to be recorded by genus or species.

Genus/Species	Data
Selasphorus	Special data form for *Selasphorus* Hummingbirds.
Empidonax	Special *Empidonax* form.
Barn Swallow	Tail formula; record as "Pyle Fig. 209 = ##mm."
Bushtit	Iris color; record as "iris = light, iris = dark."
Ruby-crowned Kinglet	Presence of red in crown; record as "C = red."
Golden-crowned Kinglet	Presence of orange in crown; record as "C = org."
Wrentit	Outer iris color; record as "outer iris = __."
Orange-crowned Warbler	Length of concealed crown patch; record as "C = ## mm."
Nashville Warbler	Length of concealed crown patch; record as "C = ## mm."
Wilson's Warbler	Length of crown patch and percent green of crown patch.
White-crowned Sparrow	Color of bill, underwing coverts, and thighs; percent black of crown stripes; width of central crown stripe.
Golden-crowned Sparrow	Crown plumage from Pyle Fig. 300; record as "cr = [A-D]."
Oregon Junco	Percent brown of nape.
Yellow-breasted Chat	Color of roof of mouth and lores; record as "mouth = __; lores = __."

Rare Birds

All Primary Banders should be familiar with the diagnostic characteristics of the top 30-50 species commonly captured and they should be aware of any similar, less-common species. When you capture an unfamiliar, unusual, or uncommon bird, document it with a photograph, using a camera with a close focus function. The bird should be held in front of a uniform background with a label with the date, location, and the last three digits of the band number. Be sure to show diagnostic characters. At the very least, take a side view with the back wing flared up to show molt and upper coverts. A top and bottom view would be advantageous. If you do not have a camera, a thorough written description covering all the major plumage areas (e.g., upper parts, undertail coverts, etc.) and color of body parts (including bill and legs) should be taken. Birds that can't be readily identified should be processed completely and photographed. The pictures should be noted in the notes section on the banding sheet and the film rapidly processed.

Mortalities

In the course of capturing birds, and despite of every precaution being taken, some mortalities may occur. Also, while working in the field, or at other times, you may encounter dead birds or be presented one by the public. While these birds' demise is unfortunate, it presents an invaluable opportunity to contribute greatly needed study specimens to scientific collections and training programs. It is essential to take preliminary actions in order to preserve these specimens' value; otherwise, a great life is lost a second time.

Specimens must be frozen as soon as possible. If you are more than an hour or so from a freezer, keep the wrapped and bagged specimen in an ice chest or cooler (or, at the minimum, in the shade). **Please keep in mind that these specimens are not of study value without the**

information listed below recorded on the wrapping and also on the outside of the plastic bag. In order to protect feather condition and shape, the bird must be rolled up in a piece of (appropriate-sized) clean paper with each end folded over toward the center of the bird, without disturbing the rectrices and head plumage. The carcass should be arranged with the wings at resting position and the legs directed towards the tail. If possible, fill the mouth with cotton (to absorb fluids). The wrapped specimen must then be placed into a plastic bag, preferably a sealed zip-lock freezer bag. Specimens derived of netting/banding activity should be recorded as Unbanded birds. Keep specimens in the field residence freezer and arrange for transport with the Project Lead.

Information that must be recorded for each specimen (on paper wrapping and on plastic bag): species (write out common name), age and sex (if known), date (day/month [three-letter abbr.]/year), location (include County), cause of death (probable if not known), and your name.

Closing the Nets and Leaving the Site

Personnel should be familiar with adverse conditions that may require early closing of nets as described in Ralph et al. (1993). These include rain, high winds, strong sun, or predator presence. Be sure to remove all twigs, leaves, feathers, etc. from the net before closing. This will greatly reduce the incidence of tearing nets while opening. Identify damaged nets with flagging marked with a permanent felt pen describing the extent and location of the damage (see Net Repairs section).

Be sure to disguise your presence as much as possible, by hiding ropes under rocks, using minimal flagging, and putting poles under brush. Wrapping and hiding the rope also keeps animals from becoming entangled. Place a stick into the PVC pipe to keep dirt and little critters out of the pipe. Count the bagged nets **BEFORE** stowing to ensure that all of the nets have been taken down. Be certain that this last step is followed, as it is the only way to be certain that no nets have been forgotten at the station before leaving (without walking the entire circuit again).

The poles should be hidden in a standardized location at each station. This is to ensure that people filling in for the regular crew can easily find the poles. They should be cached at the end of the net lane and on the side of the lane that is away from the trail that a visitor would be likely to see. If that location is not available for hiding the pole, choose the next least visible place. Be sure that all the hiding spots are well marked on the station map. Always bring a copy of the station map with you when opening and closing to ensure that the poles are stashed in the designated locations.

Visitors and External Relationships

Permits must be in each kit. If near a campground or where visitors are encountered, banders should introduce themselves and the ongoing netting work. If an adverse situation is perceived or anticipated, the Project Lead or support staff should be contacted and nets closed. Ninety-nine percent of encounters with the public will be very positive; banders should take advantage of the situation to educate the public as to the work we do and how it benefits birds.

Take visitors on net rounds with two banders so that if one bird is difficult to remove, the other bander can move on ahead with the visitors. Confine visits to nets to the last half of the morning, and never when there are so many birds that you consider taking minimum data. Make

appropriate apologies, but under no circumstances should visitors go on net rounds alone or when they may endanger the birds' safety.

Data Recording

Daily Mist Netting Journal

Record the following:

1. Station name: Record the name of the station (e.g., Oregon Caves).

2. Station code: Record the four-letter code for the station name (e.g., ORCA).

3. Day and date: Record the day of the week (e.g., Monday), as well as the date. Please spell out the month.

4. Time open: Record the time you commenced opening and the time opening was completed.

5. Time closed: Record the time you commenced closing and the time closing the nets was completed.

6. Nets run: Record each net opened, noting any individual net locations that were not opened. Record in the notes section the reason for any nets not opened or the times nets were opened or closed if different from the general open and close times for the array.

7. Total number of nets run: Record the total number of nets opened in the array on that date.

8. Net runs: Record the time each net round was started.

9. Banders: Record the complete names of all banders.

10. In each of the three time intervals (open, mid, close): Record (1) Percent cloud: Estimate the percent of cloud cover to the nearest 10% in each of the three intervals. (2) Precipitation: None (N), Fog (F), Mist (M), Drizzle (D), Rain (R) (Ralph et al. 1993). Include any descriptors such as light, heavy, steady, or intermittent. (3) Temperature: Record temperature in centigrade using the thermometer provided with your kit. (4) Wind: Record wind using the *Beaufort* scale (Appendix F).

11. Notes: Record any unusual or interesting occurrences, visitors' names, problems encountered, etc. Also record plants flowering or fruiting and all birds singing or seen carrying nesting material or food. Note when area searches were conducted and who did them.

12. Number of birds captured: Cross check totals on back of form with a second, approximate count from data forms.

13. Other species detected: Record additional bird species not captured or detected on area searches.

Banding Data Form

Refer to the sample completed form (Appendix G). Be sure to completely fill out the headings on the top of each form. Please only record bands from a single string on a banding form. When starting a new string, always start a new form. This will help ensure that band numbers are recorded and computerized correctly and will facilitate data filing, band inventory, and reporting. Lost or destroyed bands should be recorded in sequence on the new band sheets. Please record the code ("L" for lost and "D" for destroyed), band number, date, and location. Record "BALO" or "BADE" in the species code field and write "Band lost" or "Band destroyed" in the notes section. After the last band of a string is used, the form should be discontinued with "end of string" written following the last band record. Never record bands from more than one band string series on a single form, no matter if is the same size (but different strings) or different band sizes. This causes great confusion in data management and record keeping; another data form must be used.

Completed Forms

When a data form is completed, it should be immediately removed from the data book and filed in the binder in the section for completed forms. When the banding kit returns to the field residence, completed banding, journal, and area search forms must be removed from the kit. Completed forms must be proofed by the Primary Bander and two photocopies made. Photocopies should be double-sided with the notes on the back of the copy. Be certain that the copies are clearly legible (use a dark exposure setting). When the original form is copied, initial the "Copied by" space. The original forms should then be filed in a safe place until such time that they can be hand carried to the Project Lead. The journal forms should be organized by station, then by date. The banding forms should be filed in order by band size, then band number for new bands, and by date for hummingbirds, recaptures, and unbanded birds.

References

Blackshaw, S. R. 1993. An improved method of net handling and storage. North American Bird Bander **18**(2):49-50.

DeSante, D. F., K. M. Burton, P. Velez, and D. Froehlich. 2001. MAPS manual: 2001 protocol. The Institute for Bird Populations, Point Reyes Station, CA.

IBP (Institute for Bird Populations). 2007. The Institute for Bird Populations, Point Reyes Station, California. Online. (http://www.birdpop.org/maps.htm). Accessed 1 November 2007.

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North American Banding Council (NABC). 2001c. The instructor's guide to training passerine bird banders in North America. North American Banding Council Publications Committee Point Reyes Station, CA.

Pyle, P. 1997. Identification guide to North American Birds, Part I. Slate Creek Press. Bolinas, CA.

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, and D. F. DeSante.1993. Handbook of field methods for monitoring landbirds. Gen. Tech. Rep. PSW-GTR-144. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, Albany, CA.

Ralph, C. J., K. R. Hollinger, and R. I. Frey. 2004. Redwood Sciences Laboratory and the Klamath Demographic Monitoring Network mist netting station management procedures. U.S. Department of Agriculture, Forest Service Pacific Southwest Research Station Redwood Sciences Laboratory, Arcata, California. Copies available from Klamath Bird Observatory, Ashland, OR.

Sakai, W., and C. J. Ralph, editors. 2003. The Tabular Pyle. Klamath Bird Observatory, Ashland, OR.

KBO Banding Kit Equipment and Materials Inventory Checklist
Kit ID ___ Checked By ___ Date __/__/__

___ TOOL BAG

___ Hedge Shears (1)
___ Hand Pruners (2)
___ Hammer, 3# (1)
___ Hand Saw (1)
___ Work Gloves (2)
___ Spare PVC (2)
___ Rope, 1/4" 8' lengths (6)
___ Ring Clamp Stand (1)
___ Ring Clamp (1)
___ Plastic Tarp (1)
___ Foghorn, handheld (1)
___ Flagging (2)
___ First Aid Kit (1)
___ Insect Repellant (1)
___ Tecnu (1)
___ Hand Sanitizer (1)
___ Orange Caps (2)
___ Orange Vests (2)
___ Duct Tape (1)
___ Wooden Band Can Holder (1)

___ Birdbags Meshbag

_ __ Birdbags 6" x 10" (60)
___ Birbags 10" x 14" (5)
___ Small Towel (1)

___ Banding Tool Bag

Bands

___ Size 0A (200)
___ Size 0 (300)
___ Size 1 (200)
___ Size 1B (200)
___ Size 1A (200)
___ Size 2 (100)
___ Size 3 (25)
___ Size 3A (10)
___ Size 3B (10)
___ Size 4 (10)
___ Size 4L (10)
___ Size 5 (10)
___ Size 5L (10)

Banding Tools

___ Band Pliers 0-1A (2)
___ Band Pliers 2-3 (1)
___ Band Pliers 3B-3A (1)
___ Leg Gauge (1)
___ Needle-nose Pliers (1)
___ Lineman's Pliers (1)
___ 4" End-nippers (1)
___ Calipers, dial (1)
___ Wing-rule 15cm (2)
___ Wing-rule 30cm (1)
___ Band-cutter Scissors (1)
___ Circlip Pliers (1)

___ Tupperware Container

___ Weighing Cups (1 set)
___ Mechanical Pencils, # 0.7 (2)
___ Refill leads tube, # 0.7 (1)
___ Eraser (1)
___ Regular Wood Pencils (2)
___ Pencil Sharpener (1)
___ Sharpie Pen (2)
___ Orange/Red Marker (1)
___ Folding Scissors (2)
___ Scotch Tape (1)
___ Feather Envelopes (25)
___ Super Glue (1)
___ Lighter (1)
___ Rubber Bands (20)
___ Plastic Baggies (25)
___ Cotton Balls (3)

___ Small Cooler Pack

___ Hand Warmer Packs (12)
___ Electronic Scale (1)
___ Flash Light (1)
___ Camera (1)
___ 2 way Radios (3)
___ Calculator (1)
___ AAA Batteries (6)
___ AA Batteries (16)
___ C Batteries (4)
___ 9V Batteries (2)

___ NET BAG

___ 36 Mm, 12m Nets (15)
___ 3/4" swivel-snaps (32)
___ Plastic Net Bags (25)
___ Clothes-pins (White), # 1- 13 (5 of each)
___ Clothes-pins (Red), # 1-13 (5 of each)
___ Clothes-pins, blank (5)
___ Net Repair Kit (1)

___DATA BAG

___ Thermometer (1)
___ Skull Water Bottle (1)
___ Eye Drop Bottle (2)
___ Sugar Packets (4)
___ Optivisors with Cloth Bag (2)
___ Pyle 1997 (1)
___ Sibley Guide to Birds (1)
___ Metal Clipboard (1)
___ Regular Clipboard (1)
___ Tabular Pyle Keybook (1)

___ Data Binder

Data Forms

___ Mist netting Journal (20)
___ Banding Data (20)
___ Empidonax Data (3)
___ Hummingbird Data (3)
___ Area Search, 2-sided (20)
___ KBO Species Checklist (20)
___ Veg/ Location Form, 2-sided (25)
___ Blank Paper (15)
___ Lined Paper (15)
___ Kit Inventory Forms (3)

Code Sheets, Laminated

___ Banding Code Reference Sheet
___ Bird Topography
___ Skull Ossification Chart
___ Sp. Code/ Band Size
___ Target Species List/
___ How Aged/Sexed Codes (1)
___ Skull Ossification dates and Number of Primaries Reference Sheet (1)

Maps and Directions

CABN	WOOD	REBA	TOPS
ORCA	INVA	ODES	WILL
SBRR	GERB	ANT1	HOCK
JOHN	SNCO	HAMI	7MIL
WIIM	SFRD	WIWI	

Permits (Current/Nonexpired)

Master (USGS)
Subpermit (USGS)
Scientific Taking Permit
Refuge Permit

___ Reference Binder

___ Current Banding Schedule
___ Sunrise Schedule
___ KBO Contact List
___ Red Book
___ Purple Book
___ Blue Book
___ The Handbook of Field Methods for Monitoring Landbirds (Ralph et al. 1993)
___ The North American Banders' Study Guide (North American Banding Council, 2001a)
___ The North American Banders' Manual for Banding Passerines and Near Passerines (North American Banding Council, 2001b)
___ The Instructor's Guide to Training Passerine Bird Banders in North America (North American Banding Council, 2001c)
___ The Trainer's Syllabus (Ralph et. al 1993)

___ FIELD VEHICLES

___ Poles (6)
___ Spare Stakes (6)
___ Oregon GazeteerSpare PVC (2)
___ BLM Forest Service Maps
___ Full Size Shovel
___ Axe
___ Fire Extinguisher

CHECKED BY: ________________ DATE ____/____/____ CORRECTED BY: ________________ DATE: ____/____/____ EDIT ID: ____

KLAMATH NETWORK EMPIDONAX BANDING SHEET

State: [ ][ ] Year: [ ][ ][ ][ ] Bandsize: [ ][ ]

CODE:			
New Band	N	Destroyed	D
Repeat	R	Band Lost	L
Unbanded	U	Band Changed	C

AGE:		After Second Year	6
Local	L	Third Year	T
Hatch Year	H	After Third Year	V
After Hatch Year	A	Undetermined	U
Second Year	S	Not accepted	X

SEX:	
Male	M
Female	F
Undetermined	U
Not accepted	X

STATUS:	
Normal	N
Color Band	C
Injured	I
Dead	D

EMPIDONAX

RECORDER	BANDER	CODE	BAND NUMBER	SPECIES NAME ABBREVIATION	SPECIES CODE	AGE	HOW AGED	SEX	HOW SEXED	SKULL	CP	BP	FAT	B. MLT.	WING MLT	FF WEAR	JUV PLUM	MOLT LIMITS	WING	WEIGHT	STATUS	MO	DAY	CAP TIME	STATION	NET SITE #	NOTE #
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ENTERED BY: ________________ DATE ____/____/____ DATABASE NAME: ________________ SCHEDULED BY: ________________ DATE ____/____/____ (Created on 5/7/03)

KLAMATH NETWORK EMPIDONAX NOTES

Colors

Black = K Brown = N Dusky = D Green = R Gray = G	Olive = O Pink = P White = W Yellow = Y

Eye-ring Shape (use 1-2 codes)

Absent = A Indistinct = I Distinct = D	Complete = C Broken = B Round = R Tear Drop = T

Yes = Y
No = N

Outer Web of [illegible]
No Contrast = N
Slight Contrast = S
Marked Contrast = M

Band #	Upper Jaw Color	Under Jaw Color	Throat Color	Chin Color	Leg Color	Eye Ring Shape	Eye Ring Color	Lower Mandible (Base)	Lower Mandible (Tip)	Bill (from nares)	Bill Width	Longest p – Longest s	Longest p–p6	+/- p6-p10	p8-p5	+/- p10-p5	p10-p4 (>, <, =)	p6 Emarginated?	Tail Length	Wing – Tail	r6 – r1	Outer Web of [illegible]	Notes:
1										.	.	.	.	.	.	.							
2										.	.	.	.	.	.	.							
3										.	.	.	.	.	.	.							
4										.	.	.	.	.	.	.							
5										.	.	.	.	.	.	.							
6										.	.	.	.	.	.	.							
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19										.	.	.	.	.	.	.							
20										.	.	.	.	.	.	.							

Crosswalk 05/14/03

ENTERED BY:_____ DATE:____/____/____ DATABASE NAME:_____

KLAMATH NETWORK MIST NETTING JOURNAL

Station name: _____ Station Code: ☐☐☐☐

Month: ☐☐ Day: ☐☐ Year: ☐☐☐☐

Net site numbers: ____ - ____ Total # of nets: ____ Time open: ____ - ____ Time closed: _____ - _____

Net Rounds _____, _____, _____, _____, _____, _____, _____, _____, _____,
_____, _____, _____, _____, _____, _____, _____, _____, _____,

****

USE FOR NETS OPENED LATE OR CLOSED AND REOPENED DURING THE BANDING SESSION:

Net site #'s: _____ Time open: _____ Time closed: _____ Time open:_____ Time closed: _____

Net site #'s: _____ Time open: _____ Time closed: _____ Time open:_____ Time closed: _____

Net site #'s: _____ Time open: _____ Time closed: _____ Time open:_____ Time closed: _____

Net site #'s: _____ Time open: _____ Time closed: _____ Time open:_____ Time closed: _____

****

Area search letter ___@ _____ by :_____; Area search letter ___@ _____ by :_____;

Area search letter ___@ _____ by :_____; Area search letter ___@ _____ by :_____;

Area search letter ___@ _____ by :_____; Area search letter ___@ _____ by :_____;

****

Banders:

_____ _____

_____ _____

_____ _____

WEATHER	OPEN	MID	CLOSE
Cloud Cover %			
Precipitation			
Temperature ºC			
Wind/Beaufort			

Precipitation: **N** = None, **F** = Fog, **M** = Mist, **D** = Drizzle, **R** = Rain
Wind (Beaufort): **0** = calm, **1** = light air – rising smoke drifts,
2 =leaves start to rustle, **3** = twigs start to sway, **4** = moderate breeze – small branches move

BIRDS CAPTURED	
Recaptures	
New Birds	
Unbanded	
Total Captures	
Number of Species	
Number stressed	
Number Injured	
Number Mortalities	

NOTES: _____

_____

_____

_____

_____

_____

Month: ☐☐ **Day:** ☐☐ **Year:** ☐☐☐☐ **Station Code:** ☐☐☐☐

BIRDS CAPTURED:

Species Code	Recaptures	New Bands	Un-banded
Totals			

Species Code	Recaptures	New Bands	Un-banded
Totals			

NOTES (cont.): _____

CHECKED BY: ____________ DATE: ___/___/___ CODED BY: ____________ DATE: ___/___/___ EIT ID. _____

KLAMATH NETWORK BANDING SHEET

State: [ ][ ] **Year:** [ ][ ][ ][ ] **Bandsize:** [ ][ ]

COOPERATOR: [ ][ ][ ][ ]

CODE:				AGE:				SEX:		STATUS:	
						After Second Year	O				
New Band	N	Destroyed	D	Local	L	Third Year	T	Male	M	Normal	N
Repeat	R	Band Lost	L	Hatch Year	H	After Third Year	V	Female	F	Color Band	C
Unbanded	U	Band Changed	C	After Hatch Year	A	Undetermined	U	Undetermined	U	Injured	I
				Second Year	S	Not attempted	X	Not attempted	X	Dead	D

RECORDER	BANDER	CODE	BAND NUMBER	SPECIES NAME ABBREVIATION	SPECIES CODE	AGE	HOW AGED	SEX	HOW SEXED	SKULL	CP	BP	FAT	B. MLT.	FF MOLT	FF WEAR	JUV BODY PL	MOLT LIMITS	WING	WEIGHT	STATUS	MO	DAY	CAP TIME	STATION	NET SITE #	NOTE #
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BANDERS' AND RECORDERS' NAMES:

ENTERED BY: ____________ DATE: ___/___/___ DATABASE NAME: ____________ SCHEDULED BY: ____________ DATE: ___/___/___ (Created on 5/7/03)

Note #	Notes:

Appendix A. Instructions for Repairing Mist Nets.

MIST NET REPAIR 101

(for smaller tears)

As banders, we all start out handling mist nets with extreme caution; over time we learn what stresses our nets will tolerate. Most of us have experienced the dismay of creating holes, either through our own carelessness or from having to cut out a badly tangled bird [or bat]. We can ignore a few smaller holes, but at some point the net must be either fixed or discarded. (Before you begin, consider the net's age and overall condition; a fragile, sunburned old net isn't worth the effort.) However, price and availability being what they are today, you may find that fixing mist nets isn't really that difficult.

I discovered a wonderful tool used by coastal fisherman to repair their cast nets. It's a small plastic shuttle that can be loaded with black, one-ounce nylon thread ("button" thread,) which works well for small tears in almost all mesh sizes and deniers. As you learn to use it, you'll find this tool indispensable. [Shuttle and thread are available from Avinet.]

Working on a calm, overcast day is easiest on the eyes and temperament. For your repair session, you'll need a loaded shuttle and scissors. The net should be tightly stretched and opened as wide as possible so the mesh pattern can be followed more accurately. If "bag" interferes with the repair spot, try pinning up the excess by weaving a long straw of grass into the sagging upper panel. When you're finished, the straw can be drawn out quickly and easily.

Trim small torn threads away from the edges of the holes. Start your work with a solid knot on sound thread at one side of the hole. If it's a simple hole following a straight line, you can simply whipstitch it shut (fig.1.) Be sure to pass your shuttle through original netting that hasn't been damaged by the force of the tear. Make a concluding knot, and you've fixed the hole! More complicated holes require following the tear pathways individually; fox one path at a time, knotting it off, until you've closed the entire hole. If the tear is longer than 5 or 6 inches, you'll need to stabilize your thread as you progress. Just use the shuttle to create a square knot that involves your thread and the net; this keeps the net from gaping along the length of your repair thread.

MIST NET REPAIR 102

(for larger holes in large-mesh nets)

So you say a DEER went through your mist net? (This really did happen to one of our 4" - mesh owl nets when I was working at Whitefish Point Bird Observatory in Michigan.) Whether made by a deer, hawk or the neighbor's dog, large holes are a nightmare.

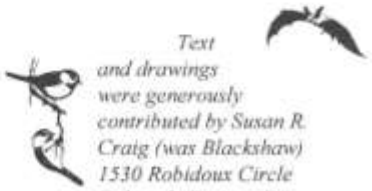
As before, trim away torn and damaged thread from the edges of the hole. If you decide that a hunk of net is actually missing, stand back and try to imagine how much net is involved. You're going to rebuild the missing net (fig. 2.)

First, from the spool of 1 ounce, black nylon thread, measure out a length of thread twice as deep as the hole, then double that before cutting. Cutting ample lengths of thread helps avoid unnecessary knots, which interfere with the net's performance. Double the thread, letting the two cut ends hang down. Secure the loop at the top into sound netting at the top of the hole. You should now have two threads, attached at one point only, hanging from the top of the hole. Repeat this process across the top of the hole, matching your knots to the mesh pattern.

Don't use the shuttle for this reweaving technique; just tie your knots, threading through mesh as you go along. Start reweaving from the top center; this allows you to judge more accurately the size of the repair patch needed. Starting from the side may be confusing, resulting in an awkward, baggy patch.

Select one thread from each of two adjacent hanging double threads; at their intersection, make a simple knot with sides matching the net's mesh (see knot detail, fig. 2.) Continue horizontally through one row of knots, matching mesh size and pattern of the net. Continue this to the second, third, etc., rows. If the hole is oval shaped, you can add more hanging threads as your work progresses downward. When your reweaving contacts the sides of the hole, simply knot into them as the mesh pattern dictates. The repair patch will slowly grow to fit the hole. Upon reaching the lower edge of the hole, tie thread ends into the edge, and trim long ends.

Although this task seems rather formidable, you'll find that large holes CAN be repaired.



Text and drawings were generously contributed by Susan R. Craig (was Blackshaw) 1530 Robidoux Circle Colorado Springs CO 80915

REP-KIT WPD 1/98

Fig. 1

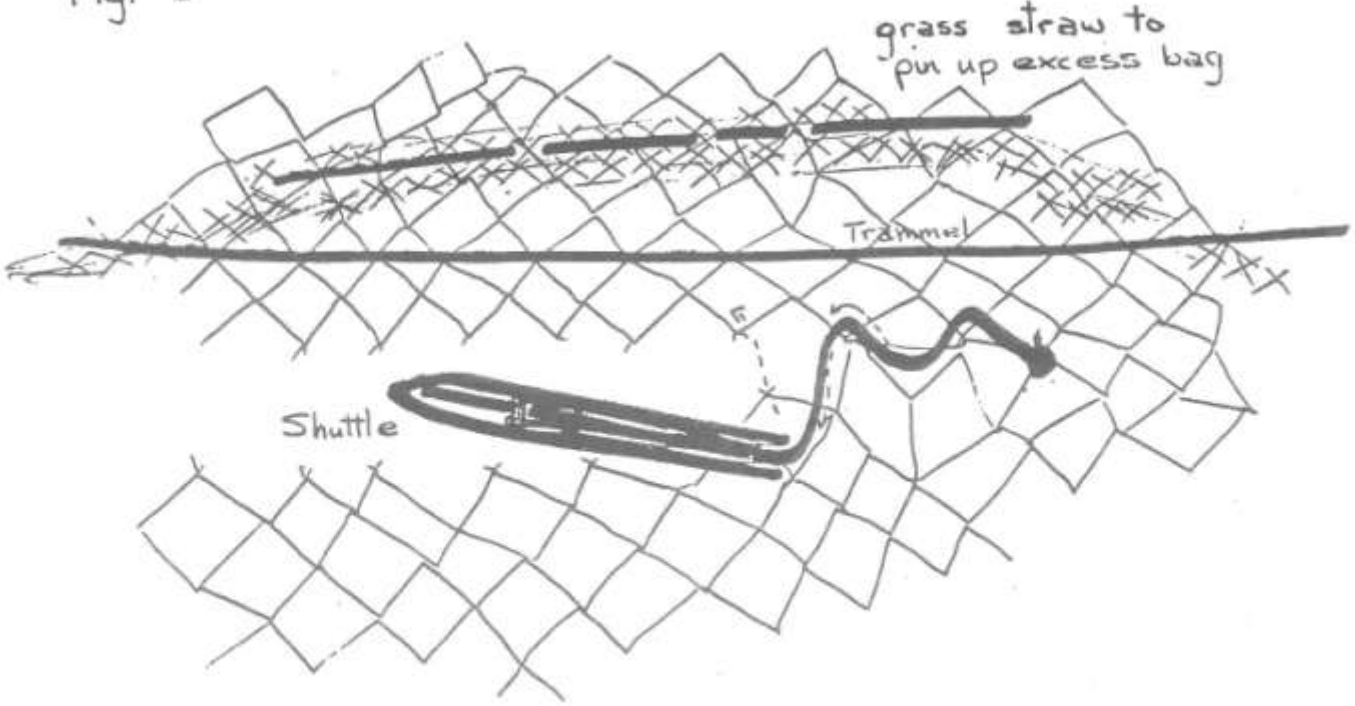
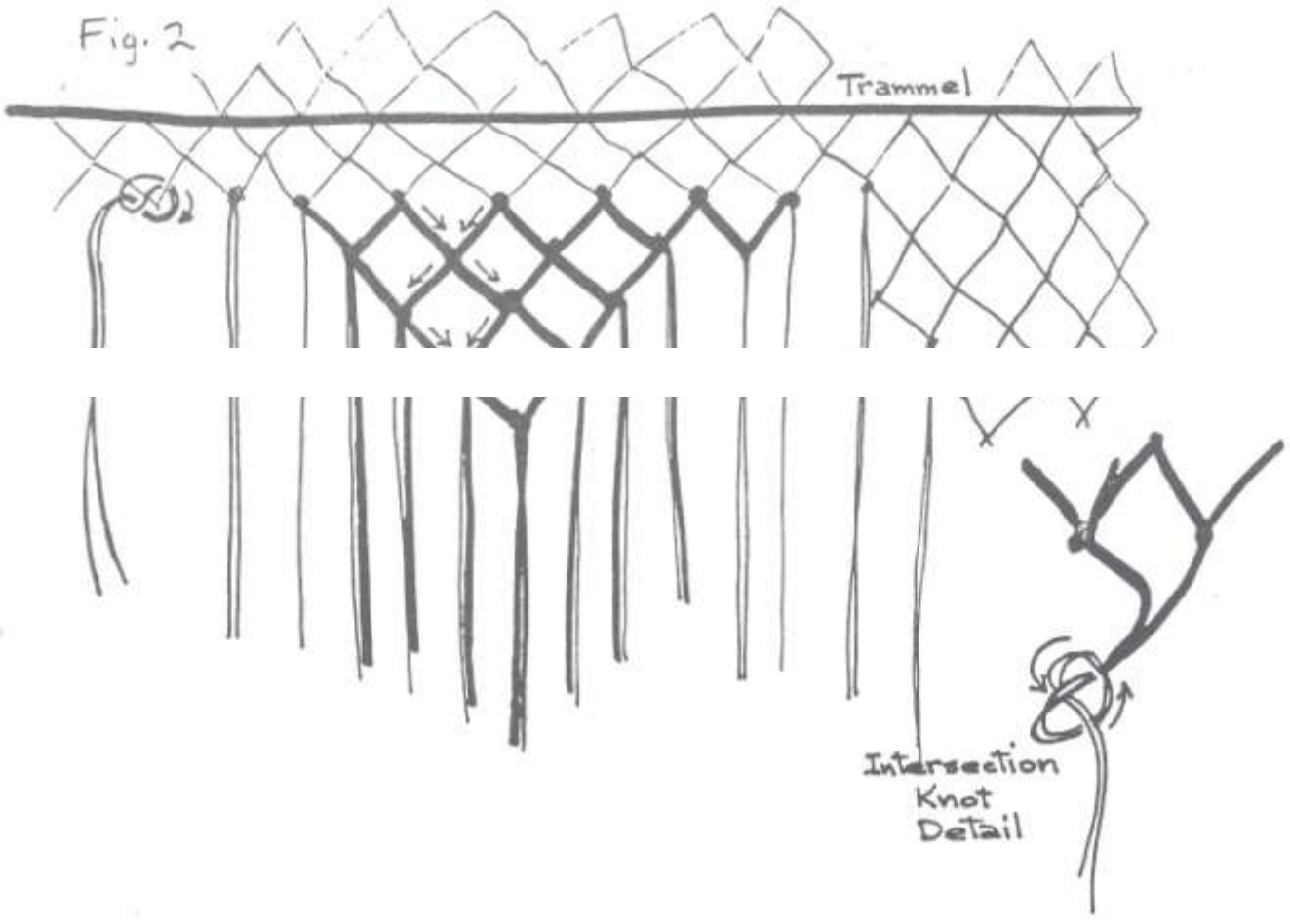

grass straw to
pin up excess bag
Trammel
Shuttle

Fig. 2


Trammel
Intersection
Knot
Detail

Loading the needle

The netting needle is a beautifully functional tool, designed to hold conveniently until required, and to serve easily when needed, as long a length of string as possible; for the fewer joining knots there are the better.

You will find it best to cut off a measured length of string before loading the needle, so that the twist produced as you load will run off at the free end. This will not be possible of course in the early stages when you do not know the capacity of the needles, so load direct from the ball in the first instance, cut off, unload the needle and measure the length of the string. Mark this by some permanent mark in the room and after this you can cut the required length of string to load the needle fully but without overloading and what is more the string can be laid out on the floor to untwist as you load.

The actual loading hardly needs any detailing as the needle is really simple.

1. Hold the needle in the left hand with the point upwards.

2. Hold the end of the string anywhere on the body of the needle with the left thumb.

a

Fig. 11

3. Run the string up the body, round the prong and down the same side of the body to trap the starting end of the string (Fig. 11a).

Note
The needle is flexible so by pressing on the point of the needle with the right hand the prong is left clear and the string can be run round it easily.

4. Take the string round the bottom or heel of the needle, between the two projections.

5. Turn the needle back to front, still with the point upwards, and continue loading by repeating the same processes:
(i) up the body, round the prong and down the same side
(ii) under the heel, turn the needle, and up the other side
(iii) round the prong again and down the same side, etc.

6. Continue until the needle is comfortably loaded. Neither the prong nor the heel should be completely filled or the string will spill off. It will be obvious that in use an extra working length of string will be released from the needle by pulling back on the needle so that the working string presses on the flexible point and clears the prong (Fig. 11b).

b

Appendix B. Instructions for Handling and Storing Mist Nets.

An Improved Method of Net Handling and Storage

Susan R. Blackshaw
2809 Hearthwood Lane
Colorado Springs CO 80917

Aside from taking birds out of mist nets, the toughest part of banding is handling the nets. Nets get tangled and twisted in their bags. Trammel lines become mixed and ends dropped as nets are put up.

Several years ago, I began using the plastic grocery bags from the supermarket checkout for my nets. I have been teaching this method of net handling whenever I can with good response. The method is learned quickly and is nearly foolproof.

TO BEGIN

You need one bag per net. Start with a net already mounted on poles, closed and rolled. Before removing the loops from the first pole, slip one bag handle through these loops, lift them off the pole, and pass your left arm through the handle above the loops. This secures trammel loops in sequence (Fig. 1). Hold the empty bag handle with a few fingers on your left hand, permitting some use of your left hand when bagging the net. Next walk slowly toward the other pole, using your left hand to gather and maintain tension on the net, while your right hand loads the net into the bag. (Left handers can reverse the procedure.) When you reach the end of the net, take the unused bag handle from left fingers, passing it through the loops, still on the pole (Fig. 2). Remove the bag handle from your left arm; then, BEFORE removing loops from poles, tie the two handles together in a gentle square knot. Finally, remove the loops from the second pole. The net is now securely bagged with trammel loops locked in sequence. It is ready for transport or, with a few mothballs, for storage.

PUTTING UP A NET

Using this method, putting up a net is done easily by one person. However, until you are comfortable with the method, an assistant may help avoid tangles and debris in the net.

Start by erecting one pole. Plan ahead for the other end of the net by placing the second pole in its approximate location, along with whatever tools you need to secure it. Untie the bag handles carefully, and without disturbing loop sequence, place one set of loops on the erected pole. For security, place both handles, one still holding loops, over your left arm. Feed the net from the bag as you go, backing slowly toward the other pole location. An assistant can help in locating the other pole site. At the end of the net, you should have the now empty bag with loops still on one handle hanging from your wrist. Carefully remove the bag handles from your wrist, place the loops over the pole, and slide the bag handle free. If all steps have been followed without twists, the net is ready to open.

Practice will enable you to take down and put up nets quickly, and even interdigitation, two nets attached to the same pole, can be done by solo banders. In time, you can perform this technique with unrolled nets, allowing even faster set up and take down.

ACKNOWLEDGMENTS

My thanks to Tony Leukering for suggestions and review.

Fig. 1 Securing trammel loops in sequence

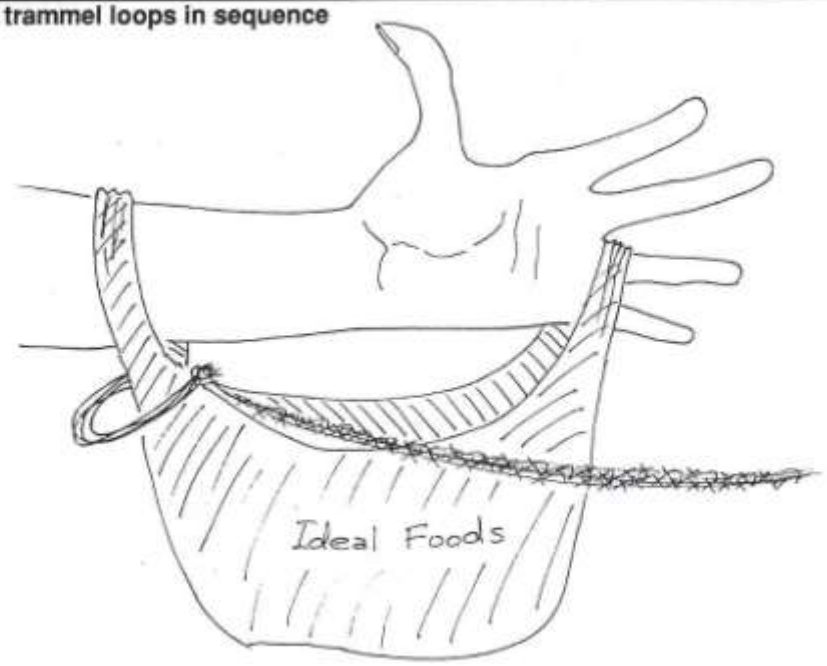
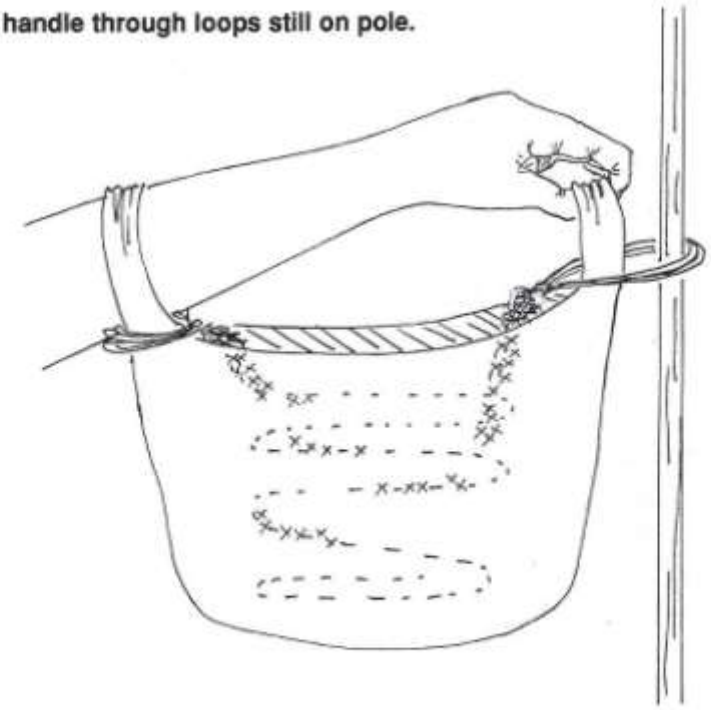


Fig. 2 Pass bag handle through loops still on pole.



Appendix C. The Target Species List. (Classifies species that can be precision-aged.)

Klamath Network SY/ASY Target Species List 2004																	
Rank	Species	pp	p10	ss	terts	pp covs	gr covs	pp vs gr covs	les covs	med covs	rects	plumage	eye color	mouth color	bill color	skull	note
A	RBSA			X		X						X	X				
A	DOWO			X	X	X	X		X	X		X	X				
A	HAWO			X	X	X	X		X	X		X					
A	WHWO			X	X	X	X		X	X		X	X				
A	NOFL			X	X	X	X		X	X			X				
B	WIFL	X		X		X					X					X	
B	HAFL				X	X	X			X	X	X				X	underparts
B	DUFL				X	X	X		X	X	X					X	
B	GRFL				X	X	X		X	X	X					X	
B	WEFL				X	X	X		X	X						X	
B	BLPH	X			X		X			X	X					X	
B	WEKI	X		X	X	X	X				X	X				X	crown
A	STJA				X	X	X			X	X			X			mouth color possible
A	WESJ			X	X	X	X				X	X		X			mouth color possible
B	BCCH				?	X	X				X			?			
B	MOCH					X	X				X			X			
B	CBCH					X	X				X			?			
A	AMDI				?	X	X										
B	SWTH	X	X			X	X			X	X					X	
B	HETH	X	X			X	X			X	X					X	
B	AMRO	X			?	X	X			X	X					X	
B	VATH	X				X	X			X	X	X					
B	OCWA	X			?	X		X			X						
B	NAWA	X			?	X	?				X	X					
B	YWAR					X	X	X			X	X			X		beware of PA molt
B	BTYW					X		X		X	X	X					
B	HEWA					X		X		X	X	X					
B	WIWA							X			X	X					
A	YBCH			X	X			X			X						
A	WETA	X		X	X	X	X		X	X		X				X	
B	GTTO					X		X			X	X				X	
A	SPTO	X		X	X	X		X			X	X	X			X	
A	CHSP										X	X					
A	BHGR	X		X		X					X	X					
B	LAZB	X		X		X											
A	RWBL								X			X					
A	BUOR	X				X	X	X		X	X	X					
B	PUFI					X	X				X	X					
B	CAFI					X	X				X	X				X	
B	LEGO	X				X					X	X					
Reminder: Refer to Sakai and Ralph 2002 & Pyle 1997 age keys **and** molts descriptions - especially for **Note:** in bold font for cautions.																	

Appendix D. The Codes for Characters Used in Ageing and Sexing Birds.

HOW AGED AND SEXED CODE REFERENCE SHEET

HOW AGED AND SEXED FIELDS

Physical differences

B Brood patch
C Cloacal protuberance
@ Egg in oviduct
E Eye color
I Mouth/bill color or striations on bill (in hummingbirds)
G Gape
F Feet or legs
S Skull ossification
Q Measurements (e.g. quantification of any part, tail length, culmen, bill depth, wing length : mass index; put specific measurement in Notes.
Y Symmetrical flight feather molt

Plumage characters

A Adult definitive (alternate) plumage
H First winter (basic) plumage (hatching year feathers)
J Juvenal plumage – retained juvenal feathers, by color and pattern, not texture.
P Plumage – try to avoid this general code, others are more specific.
L Plumage color patch length or extent - put in Notes the specific measurement of patch on; C = crown, W = wing feathers, T = tail feathers, and S = spot on center of feather, e.g. C = 15 mm 80% green (on WIWA), or gorget development in hummingbirds.

HOW AGED AND SEXED FIELDS

Feather characters

D Primary covert shape or wear
W Differential feather wear (note specific track under molt limits (e.g. primaries, tail, coverts, etc.)
V Feather shape (put in Notes the specific feathers involved, primaries, tail, coverts, etc., e.g. V prims")
T Feather texture
R Pre Juvenal molt
= Fault bar alignment
Growth bar alignment

Remaining or undetermined

O Other (such as behavior, copulation - put in Notes)
U Undetermined after examination
X Age or sex determination not attempted
Z Less precise age, but high certainty (e.g AHY vs SY)

Molt limits

M Aged by molt limits, specify feather track or no molt limit with up to 2 codes in Molt Limit field.

MOLT LIMIT FIELD

Ø No Molt limit found after examination
P Primaries
S Secondaries
C Primary coverts
G Greater coverts
V Primary vs. greater coverts
R Rectrices
L Lesser coverts
M Median coverts
B Body feathers

rev. 18-May-03

Appendix E. Reference of the Best-fitting Size Band for Commonly Captured Species.

Code	Common Name	# visible pp	p10	Early skull date	Band Size	Tab Page
RBSA	Red-breasted Sapsucker	10	reduced	n/a	1A - 1B	56
DOWO	Downy Woodpecker	10	reduced	n/a	1B	69
WEWP	Western Wood-Pewee	10	full length	1-Oct	0	95
WIFL	Willow Flycatcher	10	full length	15-Sep	0	105
HAFL	Hammonds Flycatcher	10	full length	15-Oct	0 - 0A	110
DUFL	Dusky Flycatcher	10	full length	15-Oct	0 - 0A	112
WEFL	Western Flycatcher	10	full length	15-Oct	0 - 0A	116
CAVI	Cassins Vireo	10	variable	15-Oct	1	156
WAVI	Warbling Vireo	10	variable	15-Oct	0	160
STJA	Stellers Jay	10	reduced	15-Oct	3 - 2	166
BCCH	Black-capped Chickadee	10	reduced	1-Oct	0	193
MOCH	Mountain Chickadee	10	reduced	1-Oct	0 - 0A	195
CBCH	Chestnut-backed Chickadee	10	reduced	1-Sep	0 - 0A	197
BUSH	Bushtit	10	minute	15-Aug	0A	203
RBNU	Red-breasted Nuthatch	10	reduced	15-Oct	0	205
WIWR	Winter Wren	10	reduced	1-Oct	0A - 0	222
GCKI	Golden-crowned Kinglet	10	reduced	1-Sep	0A	228
RCKI	Ruby-crowned Kinglet	10	reduced	1-Oct	0A	230
SWTH	Swainsons Thrush	10	reduced	1-Oct	1B	254
HETH	Hermit Thrush	10	reduced	1-Nov	1B	256
AMRO	American Robin	10	reduced	15-Oct	2	260
WREN	Wrentit	10	reduced	1-Sep	1	264
OCWA	Orange-crowned Warbler	9	invisible	15-Aug	0 - 0A	289
NAWA	Nashville Warbler	9	invisible	1-Oct	0A - 0	292
YWAR	Yellow Warbler	9	invisible	15-Sep	0 - 0A	299
AUWA	Audubons Warbler	9	invisible	15-Sep	0 - 0A	312
MYWA	Myrtle Warbler	9	invisible	15-Oct	0 - 0A	312
TOWA	Townsends Warbler	9	invisible	15-Oct	0A - 0	319
HEWA	Hermit Warbler	9	invisible	1-Oct	0A	322
MGWA	MacGillivrays Warbler	9	invisible	1-Oct	1 - 0	366
COYE	Common Yellowthroat	9	invisible	1-Sep	0 - 0A	368
WIWA	Wilsons Warbler	9	invisible	15-Sep	0A - 0	372
YBCH	Yellow-breasted Chat	9	invisible	1-Oct	1B - 1A	376
WETA	Western Tanager	9	invisible	1-Nov	1B	386
SPTO	Spotted Towhee	9	invisible	1-Nov	1A - 2	391
CHSP	Chipping Sparrow	9	invisible	1-Oct	0	405
FOSP	Fox Sparrow	9	invisible	1-Dec	1A	422
SOSP	Song Sparrow	9	invisible	1-Oct	1B	425
LISP	Lincolns Sparrow	9	invisible	15-Nov	0	427
WCSP	White-crowned Sparrow	9	invisible	15-Oct	1B	433
GCSP	Golden-crowned Sparrow	9	invisible	15-Nov	1B - 1A	436
ORJU	Oregon Junco	9	invisible	1-Oct	0 - 1	438
BHGR	Black-headed Grosbeak	9	invisible	1-Oct	1A	445
LAZB	Lazuli Bunting	9	invisible	1-Sep	1	450
RWBL	Red-winged Blackbird	9	invisible	15-Oct	? =2 - ? =1A	455
BHCO	Brown-headed Cowbird	9	invisible	1-Dec	? =1A - ? =1B	472
PUFI	Purple Finch	9	invisible	15-Nov	1 - 1B	491
PISI	Pine Siskin	9	invisible	15-Oct	0	499
LEGO	Lesser Goldfinch	9	invisible	15-Nov	0A - 0	502
AMGO	American Goldfinch	9	invisible	15-Dec	0 - 0A	506

Appendix F. Wind Should be Recorded According to the Beaufort Wind Scale.

Beaufort Wind Scale

Wind Speed (MPH)	Wind Effects Observed on Land	Terms Used in NWS
0-1	Calm; smoke rises vertically.	Calm
1-3	Direction of wind shown by smoke drift, but not by wind vanes.	Light
4-7	Wind felt on face, leaves rustle, ordinary vane moved by wind.	Light
8-12	Leaves and small twigs in constant motion; wind extends light flag.	Gentle
13-18	Raises dust and loose paper; small branches are moved.	Moderate
19-24	Small trees in leaf begin to sway; crested wavelets form on inland waters.	Fresh
25-31	Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty.	Strong
32-38	Whole trees in motion; inconvenience felt walking against the wind.	Strong
39-46	Breaks twigs off trees; generally impedes progress.	Gale
47-54	Slight structural damage occurs; chimney pots and stales removed.	Gale
55-63	Seldom experienced inland; trees uprooted; considerable structural damage occurs.	Whole gale
64-72	Very rarely experienced inland; accompanied by widespread damage.	Whole gale
73 or more	Very rarely experienced; accompanied by widespread damage.	Hurricane

APPENDIX G

CHECKED BY: ______ DATE: __/__/__ COPIED BY: ______ DATE: __/__/__ KIT ID. 2

KLAMATH NETWORK BANDING SHEET

State: OR Year: 2006 Bandsize: 0-

COOPERATOR: KBO

CODE:			
New Band	N	Destroyed	D
Repeat	R	Band Lost	L
Unbanded	U	Band Changed	C

AGE:			
Local	L	After Second Year	U
Hatch Year	H	Third Year	T
After Hatch Year	A	After Third Year	V
Second Year	S	Undetermined	U
		Not attempted	X

SEX:		STATUS:	
Male	M	Normal	N
Female	F	Color Band	C
Undetermined	U	Injured	I
Not attempted	X	Dead	D

RECORDER	BANDER	CODE	BAND NUMBER	SPECIES NAME ABBREVIATION	SPECIES CODE	AGE	HOW AGED	SEX	HOW SEXED	SKULL	CP	BP	FAT	B. MLT	WING MLT	FF WEAR	JUV PLUM	MOLT LIMITS	WING	WEIGHT	STATUS	MO	DAY	CAP TIME	STATION	NET SITE #	NOTE #
AFS	WW	N	242018721	Aud. warb.	AUWA	S	H	M	LP	F	M	0	0	0	0	M	0	9	73	11.9	N	06	25	102	ODES	04	1
	CJR		722	Mtn. chick.	MOCH	S	M	F	B	9	0	V	0	0	0	M	0	V	67	10.7						10	
DA	PP	N	242018723	Audu. warb.	AUWA	A	B	F	BP	9	0	V	0	0	0	M	0	9	69	12.3	N	06	26	055	CABN	02	
			724	W. woo-pee	WEWP	A	ZS	U	U	F	0	0	0	0	0	L	0	U	86	12.9				070		06	2
			725	Bk-cap chick	BCCH	D	ML	M	C	9	L	0	0	0	0	L	0	0	70	10.0				073		03	3
JG			726		BCCH	A	@	F	@	9																	4
	KH		727		BCCH	S	M	M	C	9	M	0	0	0	0	M	0	V	69	9.7				092		11	
CJR			728	Blk&wht. warb	BAWW	S	MH	M	P	F	0	0	T	0	0	M	0	G	65	12.9				102		03	5
		L	729	band lost	BALO																						6
BW	AFS	N	730	W. woo-pee	WEWP	A	S	U	U	F	0	0	0	0	0	L	0	9	85	13.1	N			102		09	
AFS	BW		731	OR junco	ORJU	A	SB	F	BP	F	0	V	T	0	0	M	0	9	68	12.9		06	29	074	7MIL	04	
		N	732	Cass. vireo	CAVI	S	SH	U	U	A	S	0	T	0	0	L	0	9	71	13.5				093		12	
	CJR		242018733	OR junco	ORJU	A	YB	F	B	F	0	W	0	0	S	M	0	9	70	13.0	N	07	01	071	ANTI	08	7
	PP	D	734	band destroy	BADE																						8
PP		N	242018735	Bk-cap. chic.	BCCH	S	M	U	U	9	0	0	0	0	0	M	0	V	67	9.9	N			071		01	
DA	WW	N	736	yel. warb.	YWAR	A	ZB	F	B	9	0	V	T	0	0	L	0	9	59	10.2							9
KH			737		YWAR	S	MH	M	PC	F	L	0	0	0	0	M	0	GR	61	11.9							
	AFS	C	738	OR junco	ORJU	H	J	U	U	9	0	0	L	0	0	S	F	9	67	12.9				100		10	10
CJR	DA	N	242018739	Aud. warb.	AUWA	H	SH	U	U	T	0	0	T	0	0	S	0	9	70	12.3	N	07	03	055	ODES	08	11
DA	CJR		740	OR junco	ORJU	A	SC	M	CP	F	M	0	0	0	0	M	0	9	69	13.7						10	

BANDERS' AND RECORDERS' NAMES: Alexander F. Skutch, William "Bud" Widdowson, CJ Ralph, Peter Pyle, David Attenborough, Jane Goodall, Ben Wieland, Kim Hollinger

ENTERED BY: ______ DATE: __/__/__ DATABASE NAME: ______ SCHEDULED BY ______ DATE: __/__/__ (Created on 5/7/03)